

Notice of Allowability

Application No.

10/049,438

Applicant(s)

NAKAJIMA ET AL.

Examiner

Art Unit

Rip A. Lee

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to November 7, 2006.
2. ☒ The allowed claim(s) is/are 9, 10, 19-21, 30, 31, 33, 35-39, and 43-49.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>12-14-04;01-29-04</u> | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

Claim 37, line 5	replace "and" with "or"
Claim 37, line 6 [†]	delete "aluminum hydroxide"
Claim 37, line 7	replace "and" with "or"
Claim 37, line 9	replace "and" with "or"

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Claim 38, line 5	replace "and" with "or"
Claim 38, line 6	delete "aluminum"
Claim 38, line 7	delete "hydroxide"

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Claim 38, line 1	replace "and" with "or"
Claim 38, line 3	replace "and" with "or"

Claim 39, line 5	replace "and" with "or"
Claim 39, line 6	delete "aluminum hydroxide"
Claim 39, line 7	replace "and" with "or"
Claim 39, line 9	replace "and" with "or"

[†] *Examiner's note:* aluminum hydroxide does not qualify as aluminum salt of inorganic acid.

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Claim 43, line 4 replace "and" with "or"

Claim 43, line 6 delete "aluminum hydroxide"

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Claim 43, line 1 replace "and" with "or"

Claim 43, line 3 replace "and" with "or"

Claim 44, line 4 replace "and" with "or"

Claim 44, line 6 delete "aluminum hydroxide"

Claim 44, line 7 replace "and" with "or"

Claim 44, line 9 replace "and" with "or"

Allowable Subject Matter

The following is an examiner's statement of reasons for allowance: Claims 9, 10, 19-21, 30, 31, 33, 35-39, and 43-49 are allowed over the closest references cited below.

The present invention is drawn to a process for producing polyester comprising adding a polymerization catalyst in a polycondensation reaction, esterification reaction, or transesterification reaction and obtaining polyester wherein the polymerization catalyst comprises an aluminum substance selected from the group consisting of aluminum carboxylates, aluminum salts of an inorganic acid, and aluminum chelate compounds, and a phosphorus compound having an aromatic ring structure.

Jackson *et al.* (U.S. 3,847,873) teaches a process for preparing aromatic polyesters in the presence of a catalyst composition comprising a phosphorus compound of formula $X^1X^2(X^3O)P=O$ wherein at least one R group attached to Z is biphenyl. The compounds ethyl *bis*(*p*-biphenyl)phosphinate and poly(diethyl *p*-vinylphenylphosphonate) are exemplary. The second component of the catalyst is a metallic component which contains aluminum. The compound $Al(acac)_3$, where *acac* is acetylacetonate, is exemplary. The reference does not show a catalyst containing *bis*(*p*-biphenyl)phosphinate and $Al(acac)_3$ or poly(diethyl *p*-vinylphenylphosphonate) and $Al(acac)_3$. Applicants have overcome a *prima facie* case of unobviousness over the prior art of Jackson *et al.* by establishing a satisfactory showing of unexpected results.

Ridland *et al.* (WO 99/28033) teaches a polymerization catalyst for making polyesters comprising an orthoester of aluminum, a diol, an organophosphorus compound containing at least one P-OH group, and a base. An example of the aluminum orthoester is $(sec-BuO)_3Al$, and the base is NaOH. The resulting organometallic species is used as a polymerization catalyst for making polyester. The organophosphorus compound is selected from phosphates, phosphonates, and phosphinates. The reference does not teach use of aluminum compounds recited in the instant claims.

Additional references relating to compositions comprising aluminum carboxylates, aluminum salts of inorganic acid, or aluminum chelate compounds and phosphorus compounds having an aromatic ring structure are summarized below. None of the patents discloses or makes obvious use of these compositions in a process for producing polyester, and therefore, the instant claims are distinguished over the prior art.

Elmore *et al.* (U.S. 4,972,036) teaches a catalyst comprised of aluminum acetylacetonate and benzyltriphenylphosphonium chloride for carrying out esterification reaction between citric acid partial ester and epoxide.

Kelley *et al.* (U.S. 4,382,132) discloses an olefin polymerization catalyst comprised of a free radical initiator, an accelerator, and co-accelerator such as decyl diphenyl phosphate and triphenyl phosphate. The accelerator is aluminum naphthenate or aluminum acetylacetonate. Other species that work as accelerator include aluminum acetoacetate and aluminum octoate.

Rekers *et al.* (U.S. 4,192,775) discloses an olefin polymerization catalyst comprised of the reaction product of CrO_3 and a phosphorus compound of formula $(\text{RO})_3\text{PO}$ or $(\text{RO})_2\text{POH}$ (R = alkyl, aralkyl, aryl) deposited on a support material, followed by treating the resulting supported material with aluminum acetylacetonate.

Yoo *et al.* (U.S. 4,318,799) teaches a catalyst prepared by treating a regenerated catalyst with one or more aluminum containing materials in combination with one or more phosphorus containing materials. Aluminum containing compounds are aluminum carboxylates having 1-20 carbon atoms, i.e., stearates, oleates, aluminum oxalates, aluminum acetates, and aluminum halides. Suitable phosphorus compounds are R_3P , $(\text{RO})_3\text{P}$, and $(\text{RO})_3\text{PO}$ where R is alkyl, aralkyl, aralkenyl. The catalyst is used for passivating metal contaminant in deactivated catalysts.

Cao *et al.* (U.S. 6,080,303) teaches a hydrocarbon cracking catalyst prepared by treating zeolite with a phosphorus compound followed by treatment with aluminum phosphate. The phosphorus compound is ammonium acid phosphate, ammonium dihydrogen phosphate, phosphoric acid, polyphosphoric acid, an organic phosphate, or an organic phosphine.

Yokota *et al.* (U.S. 4,242,479) discloses a multi-component Ziegler Natta catalyst for olefin polymerization comprising aluminum trihalide and at least one electron donor compound represented by $X_l^2Y_mP(OR^{14})_n$ or $X_q^3Y_rP(O)(OR^{14})_s$.

Mack (U.S. 4,493,903) teaches an olefin polymerization catalyst comprising titanium trihalide prepared by milling $TiCl_3$ with $AlCl_3$, an organoaluminum, and a phosphorus compound of formula $PR_1R_2R_3$ or $P(OR_1)(OR_2)(OR_3)$.

Wada *et al.* (U.S. 4,931,572) discloses preparation of lactone by hydrogenation of dicarboxylic acid in the presence of a catalyst comprising a ruthenium complex, an organic phosphine, *i.e.*, triarylphosphine, and a co-activator. Among the many choices of co-activator are aluminum acetate, aluminum acetylacetonate, aluminum benzoate, or aluminum stearate.

Pfaender *et al.* (U.S. 5,859,102) discloses a stabilizer package for PVDC resin comprising an aromatic phosphite or aromatic phosphonite in combination with a metal salt of a fatty acid such as aluminum stearate and aluminum laurate.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

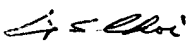
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached at (571)272-1114. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<http://pair-direct.uspto.gov>>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

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November 13, 2006


LING-SUI CHOI
PRIMARY EXAMINER